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Wendbaar wetgeven

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2018

document version

Publisher's PDF, also known as Version of record

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citation for published version (APA)

Lokin, M. H. A. F. (2018). *Wendbaar wetgeven*. [, Vrije Universiteit Amsterdam].

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Summary

A large part of Dutch legislation is implemented through IT systems. Due to the massiveness that large government agencies have to deal with, the use of ICT to perform their statutory tasks – further referred to as *digital execution* – has become indispensable. In order to implement the continuous flow of new legislation quickly and efficiently in their IT systems, they introduce various new methods of systems development, summarized under the heading *knowledge-based working*. The essence of this approach is that knowledge from legislation (rules, data, process steps), required for automated decision making, is no longer ‘locked up’ in the system, but is shaped into knowledge models outside the system, forming the basis for modular IT services to execute processes. In doing so government agencies aim to increase the agility of their IT systems and thus of the implementation of legislation.

In recent decades, a great deal of research has been carried out to find ways of supporting knowledge-based working, for example by displaying knowledge in a formalized way, supporting the conversion to automatically executable specifications. However, a method for clarifying the meaning of the legislation on which the specifications are based is still lacking. This thesis elaborates an approach for this; it focuses on the creation of legislation and is based on three pillars:

- clarifying the meaning of legislation;
- improving insight into the legal rules relevant for the task performance by government agencies;
- a different way of cooperation between actors in the legislative process.

As a basis for the development of the approach, four concrete applications of knowledgebased working at the Dutch Tax and Customs Authority and the Immigration and Naturalisation Agency have been described. A fifth example is a cross-domain application of this concept, *Standard Business Reporting*, concerning the standardization of financial statements.

Striking in these five cases is that knowledge modeling is not yet based on a direct analysis and interpretation of the legislation. Where it is based on analysis of legal sources, no tools for unambiguous interpretation of the legislation are available. Furthermore, law drafters are rarely directly involved in the conversion of legislation into IT-applications.

The approach proposed in this thesis could fill these gaps. The underlying assumption is that agile execution of legislation also requires agile legislation and that the role of the legislator as the administrator of the legal system nowadays expands to ‘technical’ system management. This leads to the central research question of this thesis:

To what extent and in what way can digital execution of legislation by national government agencies be taken into account in the legislative process?

Agile legislation has two dimensions:

- a product that is clear in terms of structure and meaning, to allow the knowledge required for digital execution to be easily distilled from it;
- a process that integrates the design of digital execution.

These dimensions have been elaborated in an approach for clarifying the meaning of legislation, consisting of three elements: a *language model*, a *legislative vocabulary* and the application of *linked data*. Furthermore, supporting tools and adjustments in the cooperation between actors in the legislative process, necessary for successful application of the approach, have been described.

Legislation is structured with regard to elements as chapters, paragraphs, articles, article parts, etc. (referred to as *formal structure*). With regard to content elements, such as types and structure of legal norms (referred to as *material structure*), it contains many ambiguities and implicit relations, impeding the conversion to digital execution. The question is whether it is possible to clarify meaning and connections, both through the text of the legislation itself and through improved access to explanatory documents, thus supporting the analysis and interpretation of legislation for knowledge-based working in the design of the digital execution.

In order to answer this question, an analysis of the formal and the material structure of legislation has been made on the basis of the *Directives on legislation* (design requirements for law drafters) and literature, taking the perspective of the executing agencies. As the material structure is essential for the design of IT-driven decision making, it has been further elaborated on the basis of the *fundamental legal relations* theory of Hohfeld and (its application in) approaches for *requirements engineering* (the process of defining, documenting and maintaining systems requirements).

Based on this analysis, a *language model* has been created through which the wording of legal concepts in legislation can be provided with a *label* or *annotation* that unambiguously expresses these concepts. The language model has been applied to several types of legal provisions in (amongst others) Dutch tax legislation, Aliens Act and Civil and Penal Code.

The annotations have been brought together in a draft for a *legislative vocabulary*, to provide insight in the wording in various legal provisions for given elements in the language model. Applying the language model to different types of legal provisions demonstrates it adds value in clarifying the meaning of legislation for translation to digital execution, but also for law drafters themselves. The legislative vocabulary may help to contribute towards mutual harmonization and standardization in law drafting.

For a correct interpretation of legislation, however, application of the language model and legislative vocabulary are not sufficient. It also requires coherent insight into the

set of rules defining a legal task, insight into explanatory documents on the relevant provisions and a more detailed insight into the connections between (elements of) legal norms. This can be achieved by making better use in law drafting of the possibilities offered by *linked data* technology. This is a method for structuring digital data by giving it a unique address (a URI, comparable to the URL for websites). Creating references between those addresses (hyperlinks) allows for the data to be presented in coherence. Linked data can be used to express implicit connections between and within legislation, for example between a term used in a domain law and the preferred expression in a general law (for example the General Administrative Law Act) or in the Directives on legislation. Establishing meaningful connections between terms and the legal provisions in various laws in which these terms are defined, facilitates the analysis and interpretation of legislation for the design of digital execution. Secondly, with linked data parts of explanatory notes and parliamentary documents can be directly linked to the relevant articles of the consolidated regulation, as published on the website www.wetten.nl. This requires a consistent and clear structuring of the explanatory documents, with as many explicit references to articles and other parts of the regulation as possible.

The use of a regular word processor sets limits to the application of the language model, the legislative vocabulary and linked data. However, software applications and techniques are available that may serve as a basis for adequate use. The thesis describes how they can be (further) developed into a special *law editor*, enabling optimal use of language model, vocabulary and linked data in the formal legislative process.

The creation of a method and applications alone, however, does not ensure a productive connection between legislation and digital execution. It also requires bringing the worlds of law drafters and system designers together. These worlds are still ‘physically’ and ‘mentally’ separated: there is no structural direct cooperation between the two while drafting legislation and designing the digital execution. Even when interaction is established, they do not speak and understand each other’s language properly. Also in the administrative and political arena, the influence of technology on the design and execution of legislation – to be regarded as an independent *technological rationality* in the process – is not always valued. Therefore, the next question is how to bridge the gap between language and technology, by establishing a different way of working among the various actors in the administrative-political legislative process. In answering this question, a distinction has been made between the ministerial and political phase of preparation of legislation.

With regard to the ministerial phase of preparing legislation, an analysis has been made of several *agile* working methods in systems and software development, such as Scrum, Lean and DevOps. The main characteristics of these methods are that projects are carried out in an iterative manner (in small subprojects with a short turnaround time) and in multidisciplinary teams (in which representatives from the business processes, IT developers and managers sit together). Elements from these

working methods have been combined in an approach that is referred to as *LegOps*, a composition of *legislation* and *operations*. This approach aims to achieve agile legislation by viewing the legislative process as part of the chain of policy making, legislation and execution and by using an iterative and multidisciplinary way of working. A transition to LegOps is not merely a question of methods and techniques though, but also of culture and organization. Bearing this in mind, preconditions to be met for the intended transition have been described, outlining what is required in terms of frameworks, education and supporting tools such as the aforementioned law editor.

Regarding the parliamentary phase of preparing legislation, a distinction has been made between changes for the short-term and the long-term. For the short-term, the foreseen adjustments are aligned to the changes in the ministerial preparatory phase: application of the law editor, mutual agreements to deal with the transparency that derives from the use of a law editor, and education, enabling members of parliament (as well as their supporting staff) to adequately weigh IT aspects in the legislative process.

For the long-term, a more fundamental reflection on the relationship between government and parliament is required. For a properly functioning parliamentary democracy, not only the relationship between citizens and representative bodies is key, but also the relationship between (co-)legislative and executive power. The latter determines the legitimacy of government: the extent to which the execution of legislation leads to legitimate and just decisions and has the intended effects. In this regard, research could be conducted into extending the LegOps approach to the parliamentary phase of the legislation process, integrating this phase in the chain of policy making, legislation and execution. Of course the research should keep an open mind for the values and guarantees that are (and must remain) anchored in the legislative process.

Another research theme concerns the impact of the application of the language model and linked data for the judiciary: to what extent can or will a judge be bound by the meaning given to legal provisions by means of annotations of the legislator? The aforementioned themes deserve a place in a broader discussion on the consequences of technological developments for legislation, governance and the judiciary, enabling them all to fulfil their role as system administrator adequately in the long-term.